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NIGER LEAPS FORWARD IN APPLIED SOLAR ENERGY RESEARCH

by Abdoulaye Boureima

One metal shed, one bench, two clamps and a few other simple tools. Such was the rudimentary equipment of the Solar Energy Office of Niger (ONERSOL) in 1964-65. Today, the Office has the resources to mass produce complex equipment -- from solar water heaters to cylindro-parabolic mirrors.

ONERSOL made a significant leap forward in 1970 when it was equipped with a laboratory containing advanced technical equipment. It was the starting point for applied research on the conversion of solar energy into electrical energy.

There is equipment, for instance, to measure solar radiation. It will allow ONERSOL, under the direction of Professor Abdou Moumouni, now rector of the University of Niamey, to plan and undertake experiments to perfect complex solar thermal installations.

One practical device is a solar stove that will be tried out among villagers in the Tera region. It is 1.5 metres in diameter and cooks between 3 and 4 kilograms of rice in an hour around noon. It is constructed essentially of a parabolic shell of moulded glass cloth, bonded with resin to a concrete form, and covered with reflecting aluminum.

The introduction of the stove in the towns and countryside of Niger remains nonetheless difficult because of the low purchasing power of households and the eating habits of the population. And although the device requires practically no upkeep, it uses many accessories, such as special utensils and thermos bottles.

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ONERSOL also manufactures devices that produce distilled water either from drinking or brackish water. The Niger Chemical Products Company, the Malbaza Cement Works, as well as certain foreign organizations (most notably the Postal and Telecommunications Office of Upper Volta) have been equipped with such a device. The most curious model being, without doubt, the "survival" distiller, highly recommended for travellers crossing the desert.

How does the device work?

A hole is dug in sufficiently damp soil and an empty container of simple construction is placed in it. The container is then covered with a transparent plastic sheet. After a few hours you have water. How much depends as much on the width and depth of the hole as on the humidity of the soil and the quality of the plastic.

ONERSOL also has solar batteries that transform light into electricity.

In 1968, in conjunction with the educational television network (no longer in existence), the Office carried out several experiments. These were so successful, in fact, that photoelectric batteries, bought in France, have become a popular source of power for television sets.

Another project for use of these modules aims at supplying electricity to small and medium-sized telecommunications stations. The radio relay of Boukanda, about 60 kilometres from Niamey, runs thanks to solar energy (600 amps/hour). It services five telephone circuits and two telex circuits. Storage batteries, charged by solar energy allow the Boukanda radio relay to function for about 10 days when there is no sun.

Technicians have also managed to transform solar energy into mechanical energy, notably for water pumping. From 1968 to 1974, a solar-operated motor supplied drinking water for both the population and all the cattle at Bossey-Bangou, a Niamey suburb. The motor eventually wore out but the installation was later renovated. It now supplies 50 cubic metres of water a day.

But the greatest achievement is without doubt the solar heat pumping station at Karma, 25 kilometres from Niamey. The station, with an output of 2500 to 3000 cubic metres of water daily, irrigates some 20 to 30 hectares of land. The surface of the solar collectors is 1000 m^2 and generates 10 kilowatts.

With a plant in operation since 1975, funds from various sources and more than 20 workers, ONERSOL has developed into a genuine industry. The production capacity of the plant is 400 water heaters per year and 1000 to 1200 m^2 of flat collectors, which are intended for the pumping stations. The Office should rapidly go beyond this, producing 500 water heaters and 3 000 m^2 of collectors.

And what about commercial successes? They only began in 1976. But many buildings (public and private, maternity and other hospitals, hotels and teaching establishments) are today equipped with solar water heaters. There have also been exports to Senegal, Upper Volta, Nigeria, Togo, and Algeria.

The manufacturing department of ONERSOL would like to extend its activities to the states in the Sahelian and Soudano-sahelian regions. The manufacture and installation in Niger of five to six pumping stations, the last of which should be installed this year, will no doubt allow ONERSOL to really take off.

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